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Filed : November 29, 2000

follows the signature page of this Amendment. On this set of pages, the insertions are underlined while the ~~deletions are in strikethrough~~.

Status of Claims

Claims 1-21 were pending in the application prior to this amendment. By this paper, Applicant has canceled Claims 12-19 and amended Claims 1, 6, and 21. Thus, Claims 1-11 and 20-21 remain pending in the application and are presented for further examination.

Discussion of Rejections Under 35 USC §112

The Examiner has rejected Claims 1-11 and 21 under 35 USC §112 second paragraph as being indefinite. Applicant has amended Claim 1 and the amended claim no longer defines the "arc-shaped surface" relative to "said straight line." Thus, Applicant believes the rejection is moot in light of the amendment to the claim.

Applicant respectfully believes that the language "said straight line or arc-shaped surface is concave with respect to the straight line" is definite. The cited language needs to be read in the context of the entire claim, in which the maximum depth of the concave surface is given by D. The value of D can be as small as 0, when the ratio of D/d is at the minimum of the claimed range. A maximum depth of 0 corresponds to a straight line. Thus, Applicant believes that the claim language is definite. Applicant respectfully requests reconsideration and withdrawal of the rejection.

Applicant has amended Claim 21 to provide antecedent basis for the terms "diameter d" and "ratio H/R". Applicant respectfully requests withdrawal of the rejections to Claims 1 and 21 in light of the amendments. The amendments are also believed to overcome the rejections to Claims 2-5 and 7-11. Applicant respectfully requests withdrawal of the rejections to these claims.

Discussion of Rejections Under 35 USC §102(b)

The Examiner has rejected Claims 1, 3-5, 12, 14-16 and 19-20 under 35 USC 102(b) as allegedly anticipated by Munakata, et al. (US 5,711,143). The Examiner alleges Munakata discloses each claim limitation. Applicant has canceled Claims 12-19, thus the rejections to those claims are moot.

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Claim 1, as amended, recites an overhead cable that includes an outermost layer having a plurality of segment strands “wherein the outer surface of each segment strand has a flat surface forming a side of a regular polygon or an arc-shaped curve surface dented from the flat surface” and “wherein a connecting portion between an end of the outer surface of the segment strand and a most projected portion of the groove has a crooked shape having an acute angle.” The cable with the segment strand having the flat surface is shown in Figure 6 while the cable with the segment strand having the arc-shaped surface dented from the flat surface is shown in Figures 3 and 5. The acute angle is clearly depicted in Figure 5 at the connecting portion of the groove and the end of the outer surface.

Munakata fails to show at least these two claim features, and thus fails to anticipate Claim 1. The cables described in Munakata have a circular outer cross section with grooves spaced around the cable. Magnified details of the grooves, showing the convex curved outer surface are shown in Munakata Figures 8 and 9. It is clear from these figures that the outer surface of the segment strand is convex curved and not flat nor “an arc-shaped curve surface dented from the flat surface” as in Claim 1. The Examiner contends that this is shown in Figures 22A-22F. Applicant respectfully disagrees with this interpretation of Figure 22 for the following reasons: Munakata describes Figures 22A-22F as “models of cross sections of cable used in fluid analysis by computer.” Munakata Col. 21 ll. 18-19. The cables of Figure 22 appear to show the same convex outer surface depicted in all of the other embodiments. Munakata does not describe the outer surface as having a flat surface and does not describe the figure in any manner that would lead one to believe that the cross sections are not similar to those shown in the other figures. The outer surface of the cables shown in Figure 22 have the same convex outer surface described in all other embodiments. It would not be logical for Munakata to perform computer analysis on a cable configuration that is different from all other embodiments described in the reference. Thus, the cables shown in Figure 22 have the same convex outer surface described for all other embodiments of the reference.

Claim 1 includes outer segments “wherein the outer surface of each segment strand has a flat surface forming a side of a regular polygon or an arc-shaped curve surface dented from the flat surface.” Munakata does not teach or suggest this claim feature, and thus does not anticipate the claim.

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The magnified views of the grooves in Munakata also show that the connecting point of the end of the outer surface with the groove does not have an acute angle. Thus, independent of the argument provided above, Munakata does not anticipate Claim 1 because Munakata does not disclose "wherein a connecting portion between an end of the outer surface of the segment strand and a most projected portion of the groove has a crooked shape having an acute angle."

Applicant thus respectfully requests reconsideration and withdrawal of the rejection of Claim 1. Because Claim 6, as amended, features substantially the same features discussed above with respect to Claim 1, Applicant also requests reconsideration and withdrawal of the rejection of Claim 6.

Claim 20 recites an overhead cable "wherein the outer surface of the cable is substantially free of convexly curved surfaces." As discussed above with respect to Claim 1, Munakata discloses cables with a convex outer surface. Therefore, Munakata does not disclose each and every element of Claim 20 and thus does not anticipate Claim 20. Applicant respectfully requests reconsideration and withdrawal of the rejection of Claim 20.

Claims 3-5 depend from Claim 1 and thus are believed to be allowable at least for the reason that they depend from an allowable base claim. Applicant respectfully requests reconsideration and withdrawal of the rejections of Claims 3-5.

Discussion of Rejections Under 35 USC §103(a)

The examiner has also rejected Claims 2 and 21 under 35 USC §103(a) as allegedly unpatentable in view of Munakata. Because Claim 2 depends from Claim 1, and Applicant believes that Claim 1 has been demonstrated to be patentable over Munakata, Applicant believes that Claim 2 is allowable over Munakata at least for the reason that Claim 2 depends from an allowable base claim. Thus, Applicant respectfully requests reconsideration and allowance of Claim 2.

Claim 21, as amended, recites an overhead cable wherein "a ratio H/R , of a maximum height H from a vertex of the regular polygon to the bottom of the groove and the radius R , is less than 0.2." Examiner's arguments are directed to the ratio of H/d , where d is the diameter of the cable. However, Claim 21 features a ratio of H to R , where H represents "a maximum height H from a vertex of the regular polygon to the bottom of the groove" and R is the radius of the

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groove. Munakata does not even disclose this ratio. Munakata discloses an embodiment wherein H is 1 mm and the radius of the grooves are 1 mm. Munakata Figure 10 and Col. 18 lines 51-59. However, this results in a ratio of H/R equal to 1, which is not the claimed range of ratios. Thus, Because Munakata fails to teach or suggest any relationship between H and R, Munakata does not disclose the H/R ratio claimed in Claim 21. Thus, Applicant respectfully requests reconsideration and allowance of Claim 21.

Discussion of Double Patenting Rejections

Because of the amendments to the claims Applicant respectfully believes that the claims in the two applications are now patentably distinct. Additionally, because the double patenting rejection is provisional, Applicant respectfully requests that the Examiner hold the rejection in abeyance until all other rejections have been overcome and the application is otherwise in condition for allowance.

CONCLUSION

Applicant has endeavored to address all of the Examiner's concerns as expressed in the outstanding Office Action. Accordingly, amendments to the claims for patentability purposes pursuant to 35 U.S.C. §§ 102, 103 and/or 112, the reasons therefor, and arguments in support of the patentability of the pending claim set are presented above. In light of these amendments and remarks, reconsideration and withdrawal of the outstanding rejections is respectfully requested. Applicant submits that the claim limitations discussed above represent only illustrative distinctions. Hence, there may be other patentable features that distinguish the claimed invention from the prior art.


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If there are any impediments to allowance of the claims that can be resolved with a telephone call, the Examiner is respectfully invited to call the undersigned. Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (Three Times Amended) An overhead cable comprising:
 - a tension-bearing core;
 - a conductive layer arranged at an outer circumference of the core; and
 - an outermost layer constituted by twisting together a plurality of segment strands,
~~and having a spiral groove~~ and a plurality of grooves, each positioned at each boundary
portion of adjoining segment strands, the segments and the grooves being spiraled along
the longitudinal direction of the cable;~~in the outer circumferential surface region of each~~
~~boundary portion of adjoining segment strands, wherein~~
wherein the outer surface of each segment strand has a flat surface forming a side
of a regular polygon or an arc-shaped curve surface dented from the flat surface;
wherein each groove comprises an arc-shaped curve having a predetermined
radius R centered about a vertex of the regular polygon and recessed from the outer
surface of adjoining segment strands; and
wherein a connecting portion between an end of the outer surface of the segment
strand and a most projected portion of the groove has a crooked shape having an acute
angle.
~~in the contour of the cross-section of said outermost layer, each groove comprises~~
~~an arc-shaped curve having a predetermined radius R centered about a vertex of a regular~~
~~polygon and each segment strand between adjoining grooves comprises a straight line or~~
~~an arc-shaped curve which has a longer radius of curvature than the radius R and is~~
~~concave with respect to said straight line;~~
~~and wherein there is a substantially discontinuous point between the straight line~~
~~or the arc-shaped curve and the groove.~~
6. (Three Times Amended) An overhead cable comprising:
 - a tension-bearing core;
 - a conductive layer arranged at an outer circumference of the core; and
 - an outermost layer constituted by twisting together a plurality of segment strands,
~~and having a spiral groove~~ and a plurality of grooves, each positioned at each boundary

portion of adjoining segment strands, the segments and the grooves being spiraled along the longitudinal direction of the cable; in the outer circumferential surface region of each boundary portion of adjoining segment strands, wherein

in the contour of the cross section of said outermost layer, each groove comprises an arc-shaped curve having a predetermined radius R centered about a vertex of a regular polygon and each part between adjoining grooves comprises a straight line or an arc-shaped curve which is concave with respect to said straight line;

wherein the outer surface of each segment strand has a flat surface forming a side of a regular polygon or an arc-shaped curve surface dented from the flat surface,

each groove comprises an arc-shaped curve having a predetermined radius R centered about vertex of the regular polygon and recessed from the outer surface of adjoining segment strands, and

a connecting portion between an end of the outer surface of the segment strand and the most projected portion of the groove has a crooked shape having an acute angle;

wherein a diameter d of a circle circumscribing the vertex of the regular polygon is within a range from 12.8 mm to 42.6 mm;

wherein said regular polygon is made within a range from a regular 12-sided polygon to a regular 24-sided polygon;

wherein said straight line or arc-shaped curve is concave with respect to the straight line connecting adjoining vertexes of the regular polygon by a maximum depth D and a ratio D/d between maximum depth D and the diameter d of circumscribing the vertexes of the regular polygon is within a range from 0.0 to 0.018;

wherein a ratio H/d between a maximum height H from a vertex of said regular polygon to the bottom of said groove and said diameter d is within a range from 0.0045 to 0.0357; and

wherein a ratio H/R between said maximum height and said radius R is within a range from 0.08 to 1.0.

21. (Amended) An overhead cable comprising:
- a tension-bearing core;
 - a conductive layer arranged at an outer circumference of the core;
 - an outermost layer formed by twisting together a plurality of segment strands, and having a spiral groove along the longitudinal direction in the outer circumferential surface region of a boundary portion of each adjoining segment strand,
 - wherein in the contour of the cross-section of said outermost layer, each groove comprises an arc-shaped curve having a predetermined radius R centered about a vertex of a regular polygon;
 - wherein the intersection between sides of the grooves and the outer contour of the segment strands between said grooves defines a sharp, substantially discontinuous edge; and
 - wherein said a diameter d of a circle circumscribing the vertexes of the regular polygon is within a range from 35 mm to 38 mm, the number of said segment strands is 12, and said a ratio H/R , of a maximum height H from a vertex of the regular polygon to the bottom of the groove and the radius R , is less than 0.2.

AMEND

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